Development of Technology and Human Capacity Building in the Nuclear Nonproliferation and Nuclear Security Fields to Support the Peaceful Use of Nuclear Energy

The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) has conducted numerous technological and human resource development activities related to nuclear nonproliferation and security in cooperation with affiliated domestic and overseas institutions toward a world without the threat of nuclear weapons or nuclear terrorism, as summarized in Fig.10-1.

Technology Development for Applications in Japan and abroad

Numerous technologies are being developed to strengthen nuclear nonproliferation and security in line with domestic and international trends. A current project on nuclear material detection and measurement includes the development of a nondestructive assay technology to measure nuclear material retaining high radiation levels using an external pulsed neutron source and wide area monitoring using radiation imaging to strengthen nuclear security at large-scale events. Nuclear forensics technology used to identify the origin and processing history of nuclear materials used in criminal acts has been improved. Small, low-cost detectors for first responders following an act of nuclear terrorism and forensic nuclear signature analyzers using artificial intelligence (AI) are also under development. These developments help to improve nuclear forensic capabilities through international joint sample analysis exercises. Furthermore, methodologies to evaluate and reduce the attractiveness of nuclear or radioactive material for anti-nuclear terrorism are being developed in collaboration with the United States of America (US).

Policy Research Based on Technical Expertise

Based on requests from related administrative agencies, the factors affecting denuclearization have been studied through case studies of the following countries: South Africa, Ukraine, Belarus, Kazakhstan, Libya, Iran, Iraq, and North Korea. The factors include the incentives for developing nuclear weapons, situations at home and abroad, technological progress, and effects of sanctions (Topic 10-1). The technical procedures related to the treatment and disposal of nuclear materials available for nuclear weapons, deactivation of their manufacturing facilities, and verification methods are also investigated and examined in a view of the peaceful use of nuclear energy.

Capacity Building Support

ISCN has conducted capacity building support activities targeting Asian countries since 2011. As of March 2021, about 4,900 participants mainly from Asian countries including Japan have joined ISCN training activities on nuclear nonproliferation (safeguards) and nuclear security. In fiscal 2020, even under the influence of COVID-19 pandemic, we turned to the online method mainly for overseas, and continued to support capacity building by conducting the world's first four overseas online training in this field. ISCN's capacity building support activities have contributed to human-resource development in Asia and have drawn high praise internationally and domestically.

Contributions to the International Verification Regime for CTBT

JAEA has been operated the international monitoring system of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and a related national data under provisional operation to establish a global verification regime for nuclear testing. Additionally, based on the voluntary contribution of the Government of Japan to the CTBT Organization (CTBTO) in February 2017, a joint radioactive noble-gas measurement project between JAEA and the CTBTO has begun in Horonobe-Cho, Hokkaido and Mutsu City, Aomori in 2018 for strengthening the CTBTO's capability of detecting nuclear tests. This project aims to monitor the behavior of background radioactive xenon in East Asia in more detail by adding two temporary monitoring stations. This project has been agreed to extend its duration until March 2022.

Support for JAEA's Transportation of Nuclear Fuels and Procurement of Research Reactor Fuels

ISCN coordinates and supports JAEA's research and development centers by procuring and transporting the necessary fresh fuel for research reactors and then transporting the spent fuel. ISCN has been contributing to the Global Threat Reduction Initiative (GTRI), which has been strengthening global nuclear security by promoting the systematic return of highly enriched uranium to the US.

Efforts to Promote Public Understanding on Nuclear Nonproliferation and Nuclear Security

ISCN promotes the understanding of nuclear nonproliferation and nuclear security at home and abroad by delivering the ISCN Newsletter containing articles on international trends and analyses of nuclear nonproliferation and nuclear security and ISCN activities, and by holding the International Forum on Peaceful Use of Nuclear Energy.

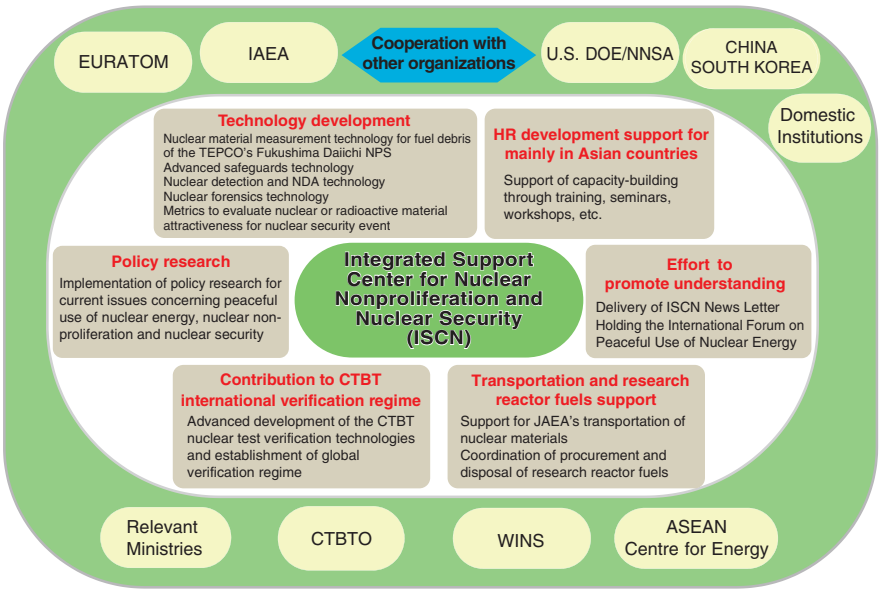

Fig.10-1 Summary of ISCN's activities and affiliated institutions
ISCN has played an active role in strengthening nuclear nonproliferation and nuclear security in cooperation with affiliated domestic and overseas institutions.